



FISHING INFORMATION

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



**NATIONAL
MARINE
FISHERIES
SERVICE**

**SOUTHWEST
FISHERIES
CENTER
LA JOLLA,
CALIFORNIA**

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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DECEMBER 1972, No. 12



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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of subsurface temperature structure for parts of the North Pacific, 3) a narrative description of pertinent surface temperature conditions, 4) charts of winds and pressures for the eastern North Pacific, 5) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 6) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. This is a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

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ENVIRONMENTAL CHARTS ANALYZED BY:

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J. Renner (Figures 1, 2, 3, 5, and 6), J. F. T. Saur (Figure 10)

CHART LAYOUT BY:

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by H. J. Hollister from observations by S. G. Westhaver at Langara Island Light; J. Godin at Cape St.
James Light; L. Collins at Kains Island Lightstation; O. A. Edwards at Amphitrite Point Light.

Scripps Institution of Oceanography, La Jolla, California, by Margaret Robinson

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Sea Surface Temperature and Environmental Conditions

L. EBER AND F. MILLER

Northeastern Pacific

Sea surface temperatures continued to be above normal over a large central region of the eastern North Pacific Ocean in December 1972. Positive departures from the long-term mean reached 4°F (2°C) or more in much of the area from 140°-160°W and between latitudes 40°N and 45°N (Figure 5). Sea temperatures also were warmer than normal along Baja California, where positive departures of 2°-4°F (1°-2°C) occurred, and in California coastal waters north to San Francisco. Sea water temperatures remained below normal in the coastal zone north of San Francisco and offshore out to 130°W and south to latitude 30°N.

The most notable changes from November to December 1972 were a tendency toward warmer sea temperature conditions between longitudes 135°W and 155°W, south of 40°N, and a tendency toward cooler sea temperature conditions in most of the area between longitudes 160°W and 175°W. Relatively cooler conditions also spread southward from the Gulf of Alaska to about 50°N.

Contributing to the modification and maintenance of the anomalous temperature distribution was a succession of lows which moved into the area north of Hawaii in the vicinity of 35°N, 155°W. This low pressure regime was established in the latter part of November and lasted through the middle of December. Its persistence is reflected in the mean isobars for December 1972 (Figure 2). The resultant winds in the area south of 40°N indicate southerly flow between the centers of low and high pressure which helped retard seasonal cooling due to surface wind stress driving warm water northward. Similarly, seasonal cooling was accelerated between 160°W and 175°W due to transport of cold water southward by northerly winds around the western sectors of the lows. The net effects of these air-sea interactions did not alter temperature conditions greatly, and the pattern of deviations from the long-term mean for December still bears a close resemblance to that of November.

Eastern Tropical Pacific

During December sea surface temperatures continued to be significantly above normal over the entire eastern tropical Pacific. Temperatures in the equatorial area and southern hemisphere usually increase rapidly from November through January. However, in December 1972 sea surface temperatures increased more rapidly than normal from Ecuador to central Peru and westward to 100°W. Elsewhere, the positive temperature anomalies were similar to those in November.

The December increase in anomalies at coastal stations in Ecuador and Peru were remarkably similar to those in December 1957, the last big El Nino year. Coastal stations near 10°S recorded higher sea surface temperatures in December 1972 than in December 1957.

For the past 8 months positive surface temperature anomalies have increased slowly and expanded westward and poleward over the eastern tropical Pacific. There was a short period in October when temperatures began to return to normal off the coast of Ecuador and Peru, but over most the eastern tropical Pacific, the warm condition has been more extensive and persistent than during any other period since 1957.

Meteorological data covering the eastern part of the tropical South Pacific revealed that since May 1972 the southeast trades have been interrupted frequently by transient polar storms. Apparently, periodic relaxations in the southeast trades along South America and in the equatorial area resulted in a weakening of upwelling in the Peru Current and its equatorial extension. This situation persisted throughout the southern winter and will probably extend into the first part of the 1973 southern summer.

Subsurface Temperature Structure in the Northeast Pacific Ocean

J. F. T. SAUR

The section of subsurface temperature observations between San Francisco and Honolulu, Figure 10, was made by the S.S. Hawaiian Enterprise during the period of December 7-11, 1972. A section taken in late December will appear in the January issue when processing of the data is completed.

The most notable change in the 2-week period since the previous section of November 20-24 is the re-establishment of a well-defined subsurface minimum-maximum temperature structure near the outer boundary of the California Current region. This broad boundary region or transition zone lies between 600 and 1000 nautical miles from the California coast. Temperature profiles at stations 8 and 10 show the typical structure of this region. In order for the water column to remain stable, the water associated with the temperature minimum at about 100 meters in depth must be lower in salinity than that in the temperature maximum at about 120-150 meters below the surface. We interpret this to indicate that the warm high salinity water of the eastern North Pacific Central (ENP) water is intruding eastward under a surface layer containing low salinity California Current water. A little farther west at station 12, the temperature minimum has disappeared and the vertical temperature structure is characteristic of ENP water.

This minimum-maximum structure, which helps identify the boundary zone, has re-established itself in a period of 2 weeks after apparently dissipating due to vertical mixing. Slightly below-normal winds and lower heat loss from the ocean by evaporation occurred in the area around 130°-150°W longitude during this period. (See section on Sea Surface Temperature and Environmental Conditions.)

Except for the change described above, the conditions are similar to those of 2 weeks earlier. The surface mixed layer is generally about 60-80 meters in depth. At stations 11 and 12 the layer deepens to about 100 meters. These stations are located in the most northern part of the ENP water crossed by the section, and the greater layer depth in this area is typical of winter conditions in earlier years. The temperatures in the surface layer and the heat content of the water column to 500 meters showed only minor changes in the 2-week period.

The trough and crest structure of the deep isotherms at stations 2 through 5 was observed in October. No observations were made in the trough area in November. The rise in the isotherms from trough to crest between 250 and 350 miles from the coast indicate a northward flow and may be interpreted as an offshore countercurrent or part of an eddy.

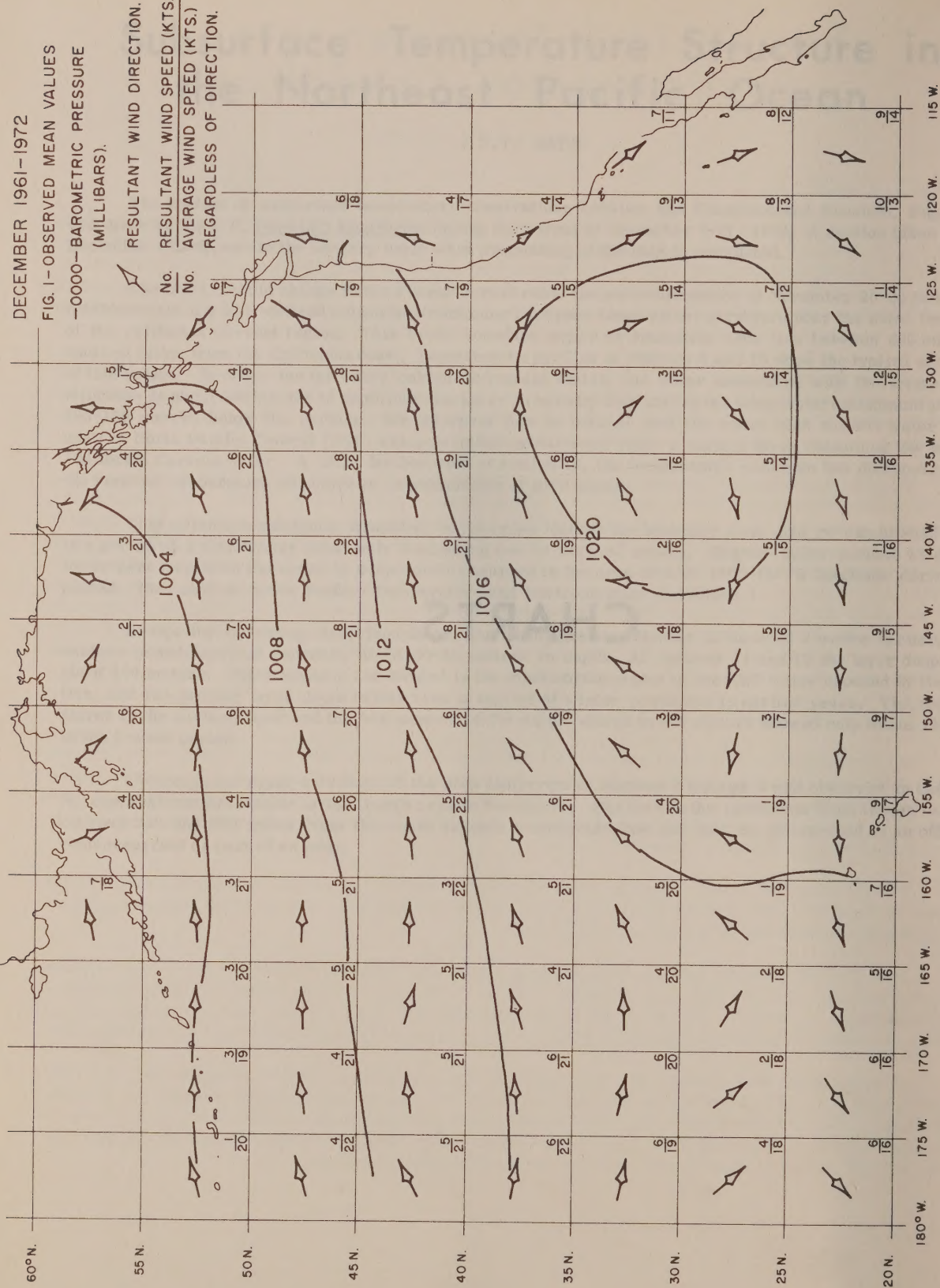
CHARTS

DECEMBER 1961-1972

FIG. 1-OBSERVED MEAN VALUES

-0000-BAROMETRIC PRESSURE
(MILLIBARS).

RESULTANT WIND DIRECTION.
RESULTANT WIND SPEED (KTS.).
AVERAGE WIND SPEED (KTS.)
REGARDLESS OF DIRECTION.



DECEMBER 1972

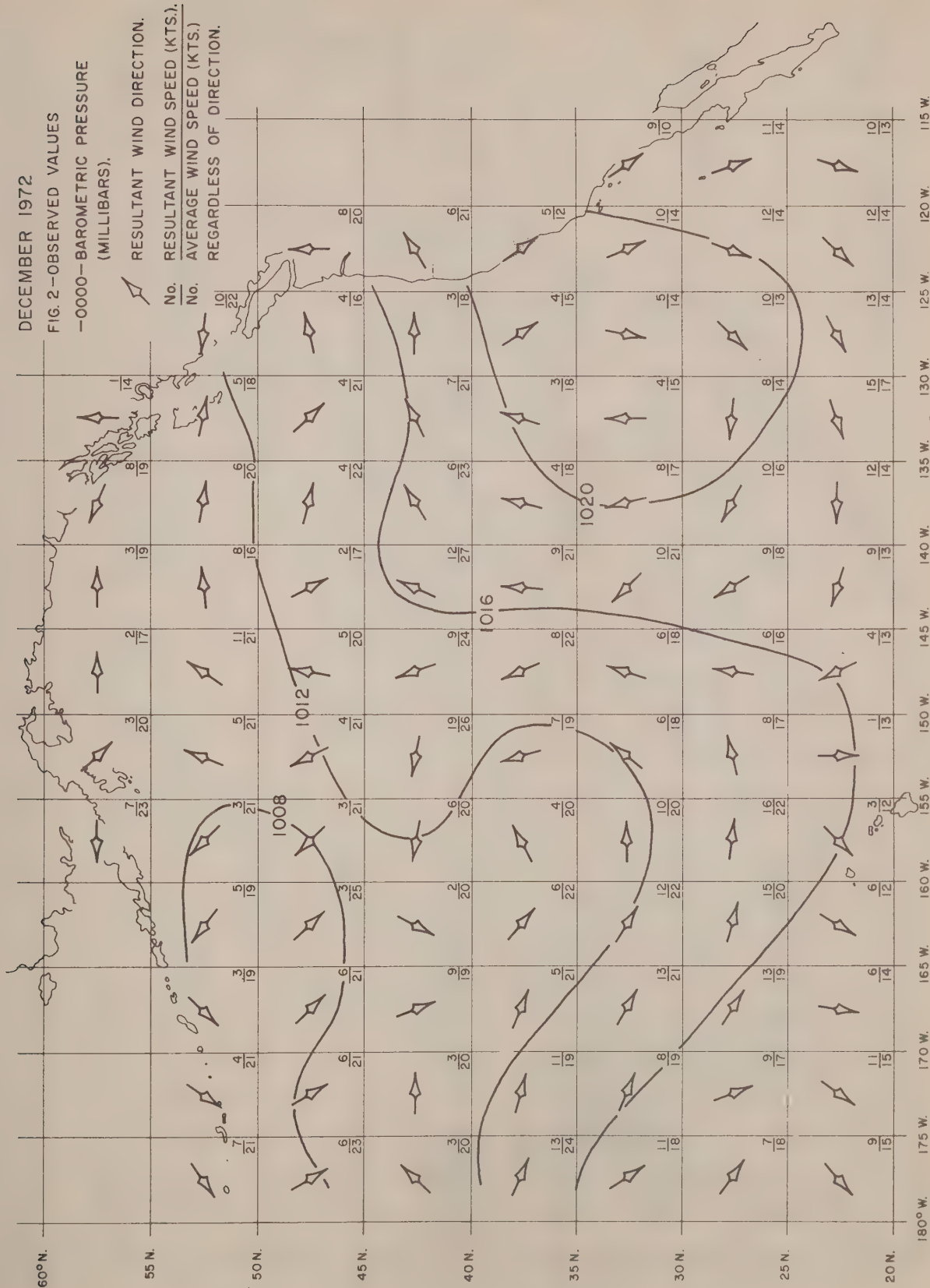
FIG. 2—OBSERVED VALUES

—0000—BAROMETRIC PRESSURE
(MILLIBARS).

RESULTANT WIND DIRECTION.

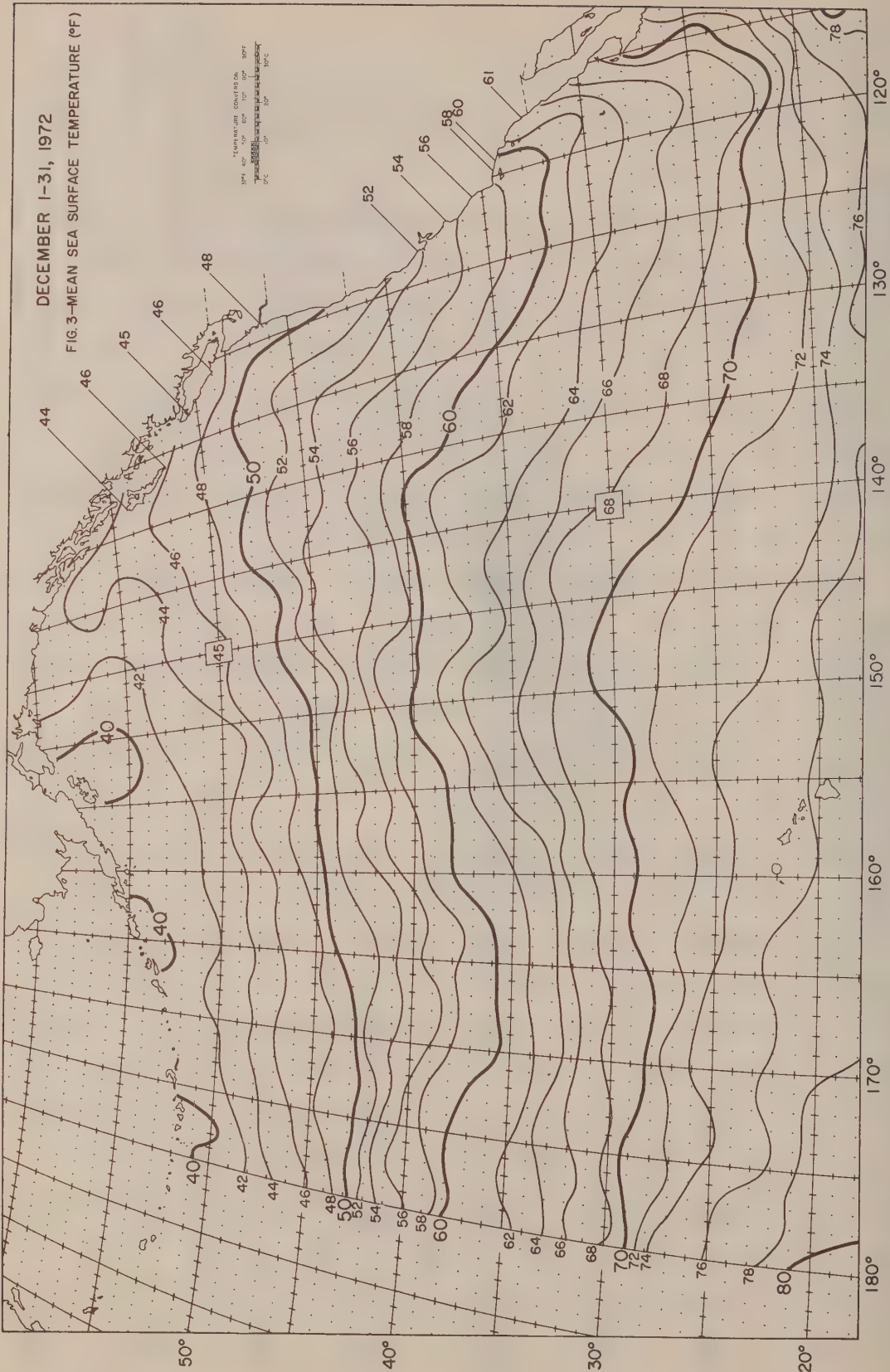
No. RESULTANT WIND SPEED (KTS.).

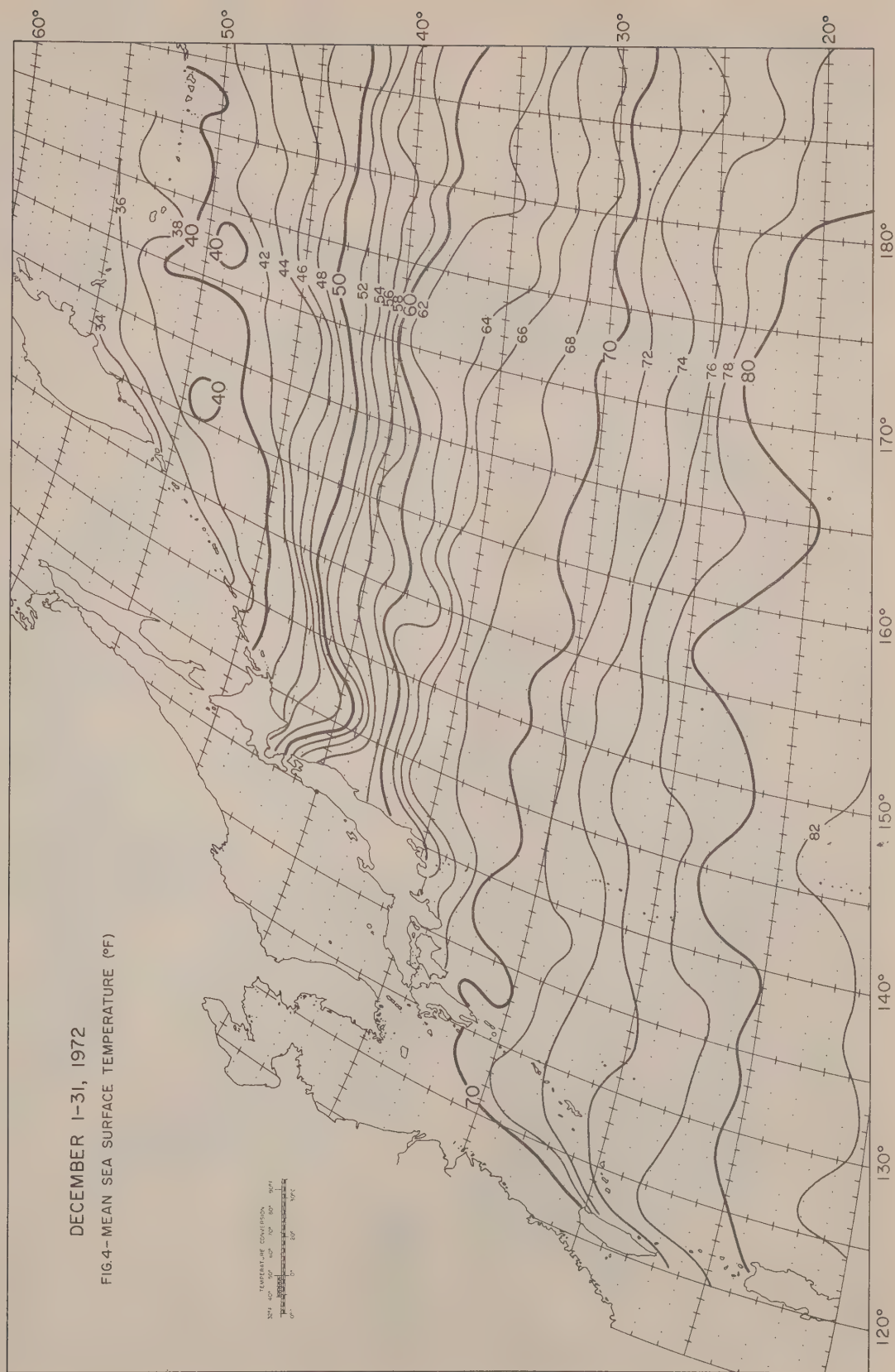
No. AVERAGE WIND SPEED (KTS.)
REGARDLESS OF DIRECTION.



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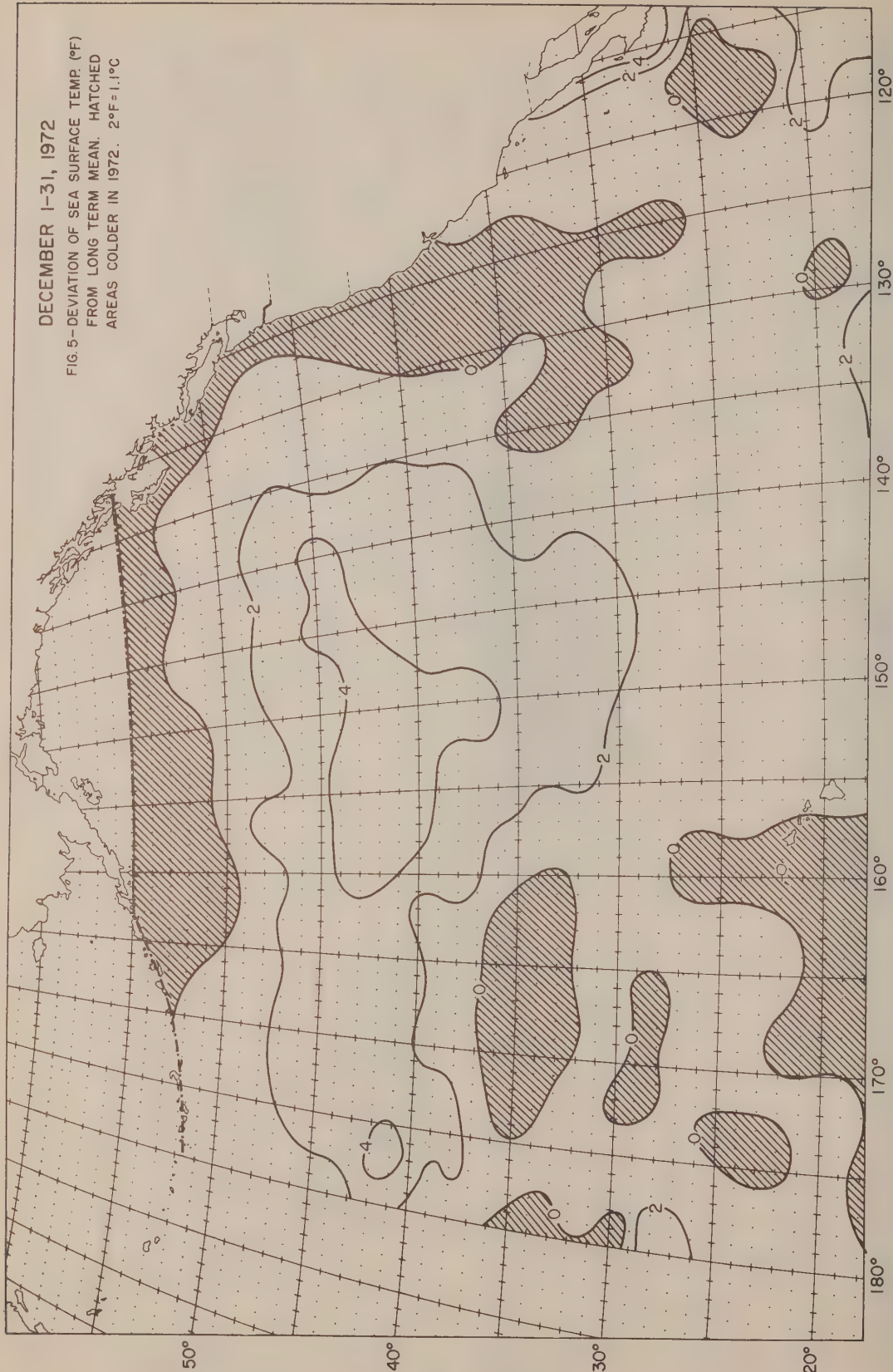
FIG. 3—MEAN SEA SURFACE TEMPERATURE (°F)





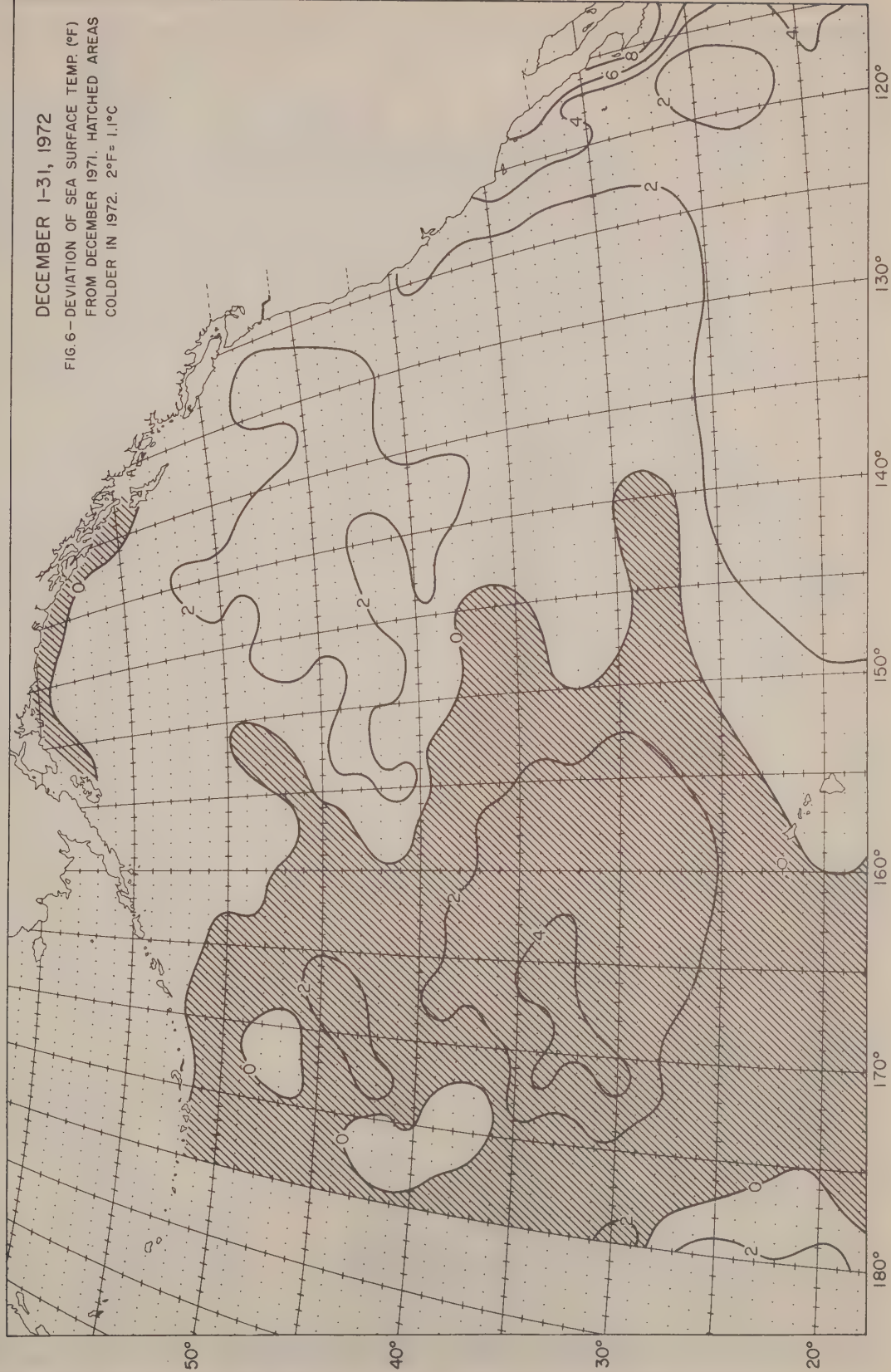
DECEMBER 1-31, 1972

FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F)
FROM LONG TERM MEAN. HATCHED
AREAS COLDER IN 1972. $2^{\circ}\text{F} = 1.1^{\circ}\text{C}$



DECEMBER 1-31, 1972

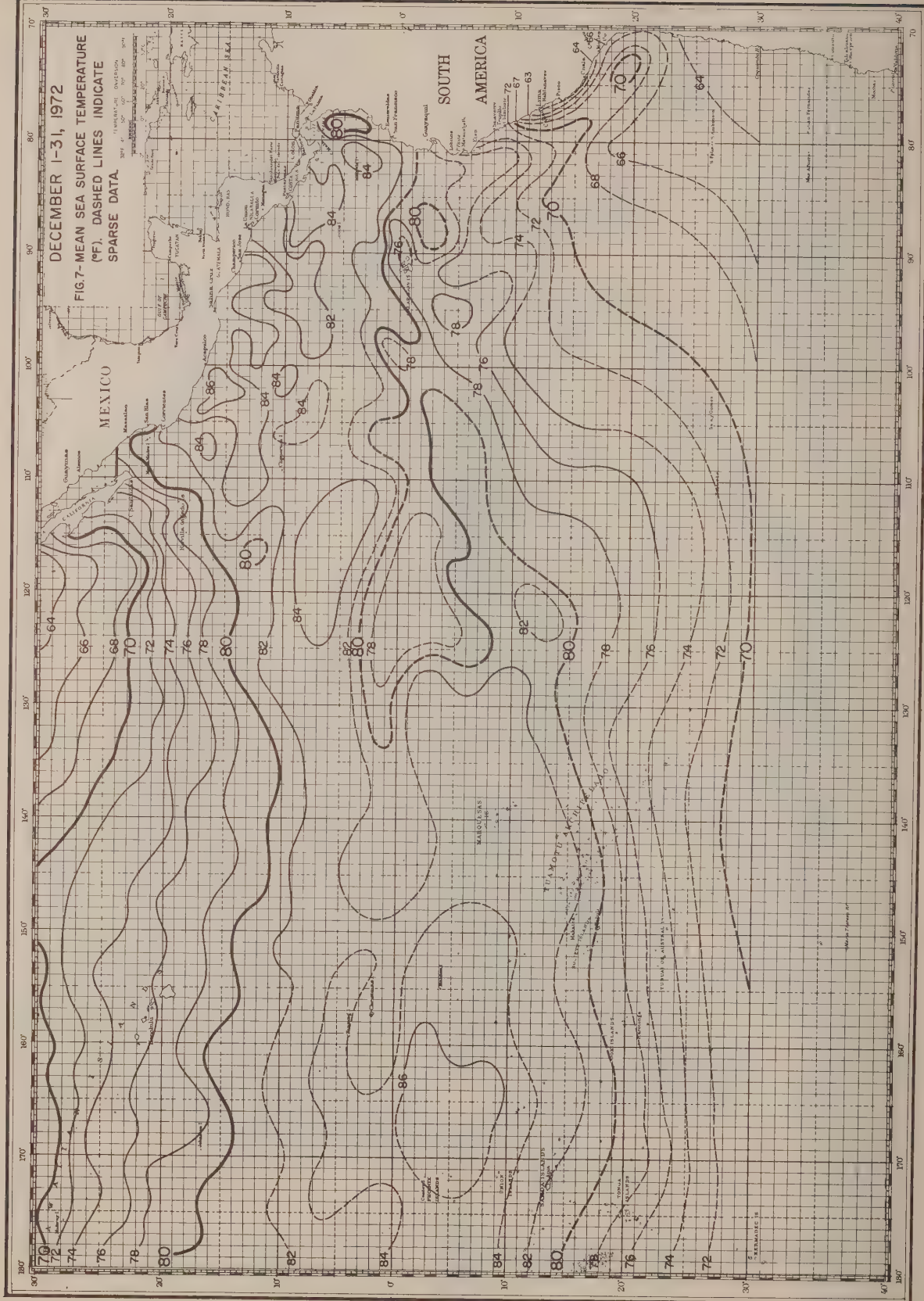
FIG. 6—DEVIATION OF SEA SURFACE TEMP. (°F)
FROM DECEMBER 1971. HATCHED AREAS
COLDER IN 1972. 2°F = 1.1°C



DECEMBER 1-31, 1972

FIG. 7-MEAN SEA SURFACE TEMPERATURE
(°F). DASHED LINES INDICATE
SPARSE DATA

TEMPERATURE DIVISION



DECEMBER 1-31, 1972

FIG. 8-DEVIATION OF SEA SURFACE TEMP
(°F) FROM LONG TERM MEAN.
SHADED AREAS COLDER IN 1972.
 $29^{\circ}\text{F} = 1^{\circ}\text{C}$



DECEMBER 7-11, 1972
SS HAWAIIAN ENTERPRISE, Voyage 54

FIGURE 10.

